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NASA TECH BRIEF

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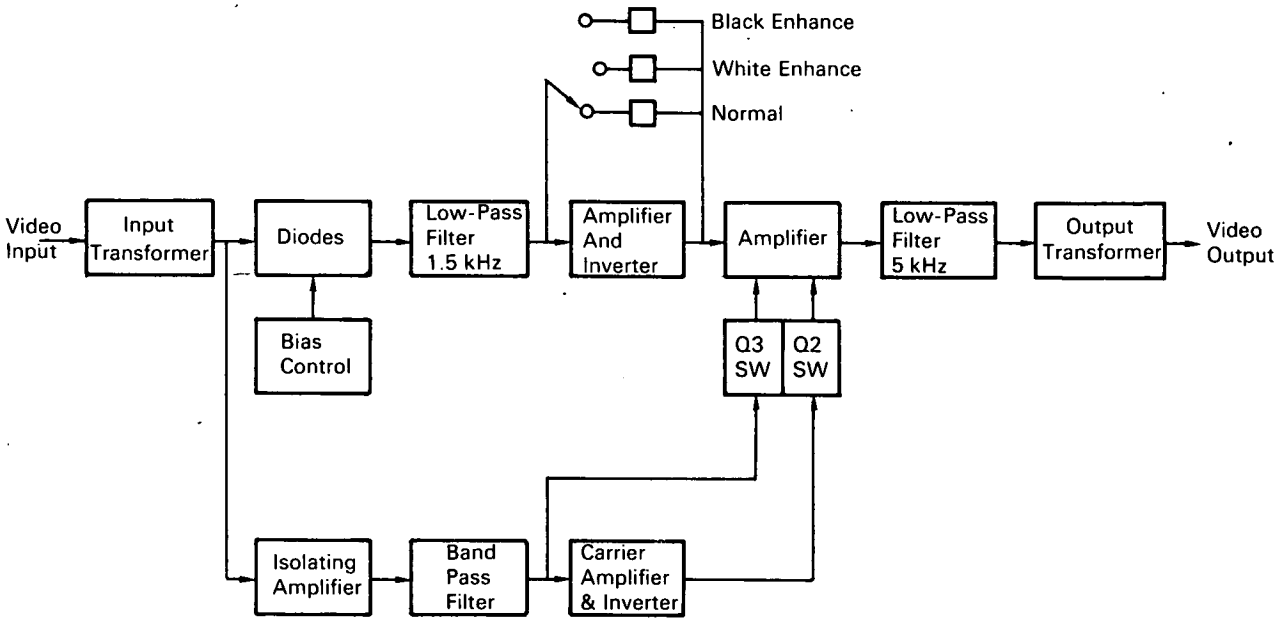
Facsimile Video Enhancement Device



The APT (automatic picture transmission) system on some current weather satellites is similar to domestic television operation except for picture transmission which is in 240 rpm facsimile format. Similar facsimile systems are also used by commercial wire services. In the case of the satellites' APT system, the video signal is amplitude-modulated on a 2400 Hz subcarrier. This subcarrier, containing the picture, is then transmitted to the ground via the VHF transmitter. In a malfunctioning APT system, the modulation shifts from the design limits and the receiving facsimile, being unable to compensate for this shift, cannot present pictures suitable for meteorological evaluation.

To overcome this condition, a device called a video remodulation unit has been fabricated to demodulate the signal and then remodulate it, using the same carrier. By using the unit controls, modulation can be set to levels that compensate for picture in-transit degradation.

The unit corrects for the black shift observed on the modulated waveform as transmitted. Provision for selecting a nonlinear transfer function enables the user to enhance the white or black areas. There are 4 modes of operation. In the first mode, the internal circuitry is bypassed and the input signal is connected directly to the output connector. The second is a

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linear operating mode in which the unit demodulates the input amplitude-modulated video waveform and resets the black level of the envelope waveform. The resultant waveform is amplified, its contrast levels reset and it is then applied to a modulation circuit that remodulates the waveform with the original 2400 Hz carrier frequency detected from the input waveform. The third and fourth modes operate essentially the same as the second mode, with the exception of nonlinear networks. These are switched into the feedback of the operational amplifier, which then amplifies the rebiased envelope waveform. The third mode enhances the black area of the picture, and the fourth the white area. Enhancing one area reduces contrast in the other.

Notes:

1. While this unit has been designed to enhance facsimile transmission using a 2400 Hz carrier, with modification it will improve degraded pictures on any standard facsimile carrier.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland 20771
   Reference: B68-10207

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

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